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Patentanmeldung Nr. Patent application No. Demande de brevet n°

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Shaving apparatus

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## Shaving apparatus

The invention relates to a shaving apparatus including at least one shaving head including a shaving surface for contacting the skin during shaving and at least one cutter moveable behind the shaving surface, a drive structure including a motor and coupled to the at least one cutter for driving movement of the at least one cutter and a housing containing 5 the motor and carrying the drive structure.

Such a shaver is known from practice for instance in the form of Philishave shavers of various designs.

10 Electric shavers are typically used in the bathroom which is an environment where electric appliances may easily be damaged, due to mechanical failure when the apparatus falls onto the, typically hard, bathroom floor or, in particular if the apparatus is used for wet shaving, entry of humidity into the housing. Ingress of humidity may also result from damage to the housing.

15 The visual appearance and tactile properties are further important features of an electric shaver and need to be reconciled in the design of the housing with the aforementioned mechanical requirements. In practice, these mechanical requirements limit the extent to which demands with respect to the visual appearance and tactile properties can be met.

20

It is an object of the present invention to provide an apparatus in which the visual appearance and tactile properties are less restrained by mechanical requirements of the housing and in which changes in the design with respect to visual appearance and/or tactile 25 properties require less extensive redesign and retooling.

According to the present invention, this object is achieved by providing a shaving apparatus according to claim 1.

Since the requirements with respect to shielding of the motor and the power supply means as well as with respect to support and mutual positioning of the drive structure

and the shaving heads are met by the housing, the appearance and tactile properties of the shell structure can be designed without regard to these requirements. New exterior designs of the electric shaver can be generated quickly, because the main constructional requirement the shell structure has to meet is that it needs to be mountable to the housing. The functional 5 platform formed by the housing and the drive structure and shaving heads mounted thereto, that are fully developed and tested to meet functional and safety requirements, may be maintained unchanged. New tools only need to be provided for manufacturing the redesigned shell structure. Another advantage is that the exterior design of shavers is determined at a relatively late stage in production, so that production can respond more rapidly to demands 10 for different shaver models. In production, the selection of the shell structures to be mounted to basic bodies including the housings can be determined at a late instance.

Particular embodiments of the invention are set forth in the dependent claims. Further aspects, effects and details of the invention are described with reference to examples shown in the schematic drawings.

15

Fig. 1 is a frontal view of a first example of a shaving apparatus according to the invention of which a shell is shown as a transparent housing part;

20 Fig. 2 is a side view of the shaver according to Fig. 1;  
Fig. 3 is a cross-sectional view along the line III-III in Fig. 2;  
Fig. 4 is an exploded view of the shaver according to Figs. 1-3;  
Fig. 5 is a cut-away side view of a second example of a shaving apparatus according to the invention;

25 Fig. 6 is a frontal view of the housing and a portion of the drive structure of the shaving apparatus according to Fig. 5;

Fig. 7 is a cut-away side view of a third example of a shaving apparatus according to the invention; and

~~Fig. 8 is a front view of the housing and a portion of the drive structure of the shaving apparatus according to Fig. 5.~~

5 The apparatus includes a housing 1 and a drive structure including a motor 2 in the housing. The drive structure, of which drive stubs 3 coupling the drive structure to cutters 4 of shaving heads 5 are shown in the drawings, is carried by the housing 1. The shaving heads 5 are suspended in a shaving head holder, which according to this example is constituted by a shaving head holder base 7 and a shaving head holder cap 8.

10 The shaving heads 5 each have a shaving surface 9 for contacting the skin during shaving and the cutters 4 are each moveable behind the shaving surface 9 for cutting off hairs that project through hair catching apertures (not shown) in a screen forming the shaving surface 9.

15 The drive structure is coupled to the cutters 4 for driving movement of the cutters. According to this example, power supply for the motor 2 is provided by a rechargeable battery 10 and controlled by circuitry 11 connected to a plug socket 37. The power supply formed by the battery 10 and the circuitry are arranged inside the housing 1.

20 Although the power supply means inside the housing are shown to include a battery and control circuitry, it is observed that the power supply means inside the housing may for instance consist merely of electric conductors connected to the motor, for instance if the shaver does not include a battery and the power control circuitry is arranged in a contact plug to be connected to the mains and connected to the motor via a permanently connected power supply cord.

25 A shell structure 12 envelops a portion of the housing 1 behind the shaving heads 5 and is mounted to the housing 1. As is best seen in Fig. 4, the shell structure consists of a plurality of shell parts, including a front face 13, a rear wall 14, side panels 15, 16 and a trimmer cover 17.

30 Since the functional requirements of shielding the motor 2 and the power supply 10 and providing a support structure for the drive structure and the shaving heads is fulfilled by the housing 1, the shell structure 12 can be provided in a wide variety of designs and finishes and, in production, the exterior design can be determined at a late stage of production, for instance in response to demand for particular designs or particular indications on the shavers. Also, new exterior designs of the apparatus can be generated quickly, because the only constructional requirement is that the shell need to be mountable to the housing 1 and the functional platform of the housing 1 and the drive structure and shaving heads 5 mounted thereto, that are fully developed and tested to meet functional and safety requirements, may be maintained unchanged.

The shell structure 12 does not envelope the housing completely, for instance a face against which the shaving head holder 7 is to be mounted and an opening of the plug socket 37 are not covered. Also other portions of the housing may be left uncovered by the shell structure, for instance to allow access to control members, to a battery compartment 5 and/or to members for engaging a storage and/or cleaning holder or to selectively leave surface portions of the housing exposed. However, it is understood that the enveloping shell covers at least major portions of the surface of the housing on opposite sides of the housing so that it substantially determines the exterior design and tactile properties of the shaver.

According to the present example, the housing 1 is waterproof, for which 10 purpose housing portions 18, 19 are mounted to each other with a seal 20 in-between. Since the exterior shape of the shaver is determined by the shell structure 12, the stiffness of the housing 1 along its seams, which is required to reliably keep it waterproof, is not compromised by demands with respect to exterior design and tactile properties. For instance, 15 outer reinforcements of the housing 1 and sinks in the outer surface of the housing 1 resulting from internal ribs may be allowed without disturbing the appearance of the shaver after the shell structure has been mounted. Furthermore wide seams, even of different and varying widths and a relatively large seal 20 may be provided without disturbing the visual appearance of the apparatus, because the seams and the seal 20 are hidden behind the shell 12.

As is best seen in Figs. 1-3, the shell structure 12 includes shell portions that 20 are spaced from the housing 1, such that an interspace 21 is left between the housing 1 and said shell portions. The interspace allows deformation of the shell portions spaced from the housing 1, without hitting the housing 1, so that large deformations of the shell 12 are allowable and accordingly large amounts of impact energy can be absorbed relatively 25 smoothly. Thus, the shell 12 may also contribute to shielding the housing 1 from direct impacts. For this purpose, it is also advantageous if the shell is made of impact absorbing materials, such as relatively soft plastics

~~Contribution of the shell structure to the interspace 21 to the absorption of impact energy~~

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to be specifically selected in accordance with the respective functions. For instance at least one portion of the shell 12 may be of a more impact resistant material and/or softer material than the housing 1. The shell structure may for instance include: metal, rubber, wood, leather, textile, transparent, opaque and/or foam material. Also the surface texture and surface finish of the shell structure 12 may be selected without regard to mechanical requirements the housing 1 needs to fulfill. The use of a shell structure enveloping the housing also allows the use of transparent or opaque components that are coated on the inside, to counteract damage to the coating and to obtain a particular visual effect.

The shell 12 is mounted to the housing 1 by a combination of bolts 23 and 10 snap connections, such that the shell 12 is detachable from the housing 1. This allows to easily replace any damaged or worn shell portions. Because removal of the shell 12 does not provide the user access to the internals of the housing, replacement of shell portions can safely be carried out as a do-it-yourself operation by unskilled consumers and also allows the user to change the appearance of the apparatus, for instance to match the bathroom design.

15 Figs. 5 and 6 are illustrations of an example of a shaving apparatus according to the invention in which the housing 51 a first operating member 74 in the form of an on/off button. The shell 62 includes a panel 78 that carries a second operating member in the form of a rubber push button membrane 79 of which a protrusion 80 is operatively connected with the first operating member 74 for mechanically operating the on/off button if the rubber push 20 button 79 is pushed. Thus, operating members on the housing 51 may be operated by actuating connected operating members of the shell 12.

The housing 51 further comprising three optical signaling members in the forms of differently colored LEDs 75, 76, 77. The shell 62 includes two windows 81, 82 in the form of light guides via which optical signals generated by two of the LEDs are visible. 25 The control system of the shaver may for instance be arranged, such that in the shown model, the central LED 78 is not operative. The user is only confronted with light guides 81, 82 in front of the operative LEDs and is not caused to think that the central LED is defective, even if the same housing 51 is used for a model comprising a smaller number of operational LEDs, or LED positions, than the number of LEDs in the housing 51.

30 In Figs. 7 and 8, yet another example of a shaving apparatus according to the invention is shown, in which, an operating member 133 on the shell 112 is electrically (instead of mechanically) connected to an operating member in the housing 101. To this end, the operating member 133 on the shell 112 is formed by a switch. The shell is also provided with a display 138. According to this example, the display is an LCD display. The position of

the display 138 integrated in the shell structure 112 provides the advantage that the display is completely visible from a wide range of angles. An electric cable 134 is connected to the switch 133 and the display 138. The electric cable is provided with a plug 135 connected to a plug socket 136 in the housing 101.

5 Having described the invention with reference to examples, however, many modifications thereto will become apparent to those skilled within the art without deviation from the invention as defined by the scope of the appended claims.

**CLAIMS:**

1. A shaving apparatus comprising:
  - at least one shaving head (5) including a shaving surface (9) for contacting the skin during shaving and at least one cutter (4) moveable behind the shaving surface (9);
  - a drive structure (3) including a motor (2) and coupled to the at least one cutter (4) for driving movement of the at least one cutter (4);
  - electric power supply means (10, 11) connected to the motor;
  - a housing (1; 51; 101) containing the motor (2) and at least part of the electric power supply means (10, 11) and carrying the drive structure (3); and
  - a shell structure (12; 62; 112) enveloping at least a portion of the housing (1; 51; 101) behind the at least one shaving head (5) and mounted to the housing (1; 51; 101).
2. A shaving apparatus according to claim 1, wherein the housing (1; 51; 101) is waterproof.
- 15 3. A shaving apparatus according to claim 1 or 2, wherein the shell structure (12; 62; 112) includes shell portions spaced from the housing (1; 51; 101), such that an interspace (21) is left between the housing (1; 51; 101) and said shell portions.
- 20 4. A shaving apparatus according to claim 3 and 4, further comprising at least one draining passage (13) for draining the interspace (21) between the housing (1; 51; 101) and the shell (12; 62; 112).
- 25 5. A shaving apparatus according to any one of the preceding claims, wherein at least a portion of the shell structure is of a more impact resistant material than the housing (1; 51; 101).
6. A shaving apparatus according to any one of the preceding claims, wherein at least a portion of the shell structure is of a softer material than the housing (1; 51; 101).

7. A shaving apparatus according to any one of the preceding claims, wherein the housing (51; 101) includes at least a first operating member (74; 136) and wherein the shell (62; 112) includes at least a second operating member (79; 133) operatively connected with said first operating member (74; 136).

5

8. A shaving apparatus according to claim 7, wherein said second operating member (79) is mechanically connected with said first operating member (74).

9. A shaving apparatus according to claim 7 or 8, wherein said second operating member (133) electrically connected with said first operating member (136).

10. A shaving apparatus according to any one of the preceding claims, further comprising an optical signaling member (75, 76, 77) said shell (62) including a window (81, 82) via which optical signals generated by said optical signaling member are visible (75, 76, 15 77).

11. A shaving apparatus according to any one of the preceding claims, wherein the shell (12; 62; 112) is detachable from the housing (1; 51; 101).

**ABSTRACT:**

A shaving apparatus has one or more shaving heads (5) with a shaving surface (9) for contacting the skin during shaving and at least one cutter (4) moveable behind the shaving surface (9). A drive structure (3) including a motor (2) and coupled to the cutter or cutters (4) for driving movement of the cutter or cutters is carried by a housing (1) containing the motor (2) of the drive structure. A shell structure (12) envelopes at least a portion of the housing (1) behind the shaving head or heads (5) and mounted to the housing (1).

**Fig. 2**

1/3

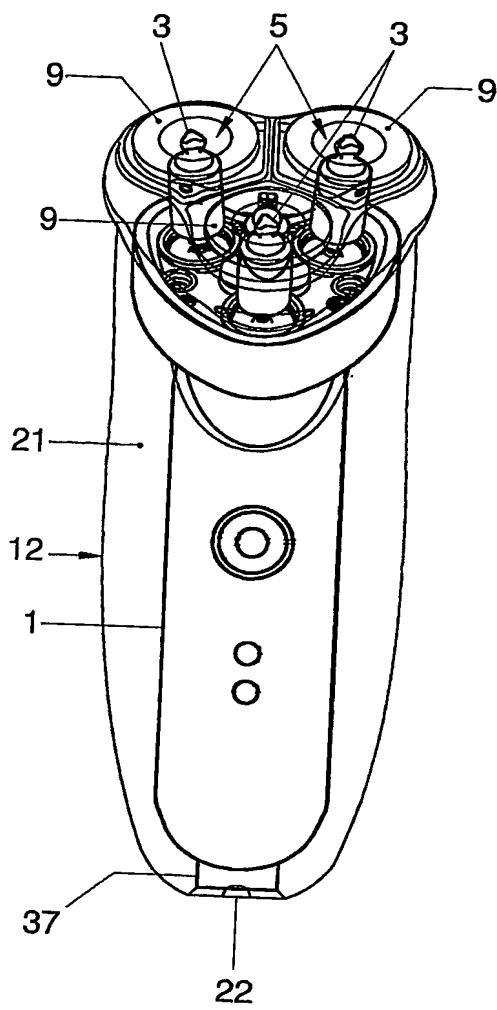


Fig. 1

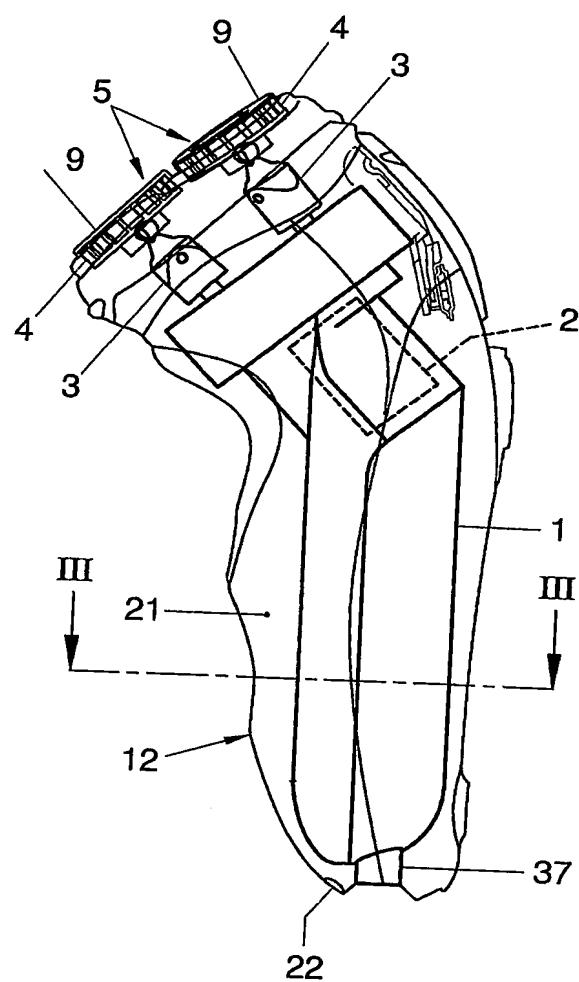


Fig. 2

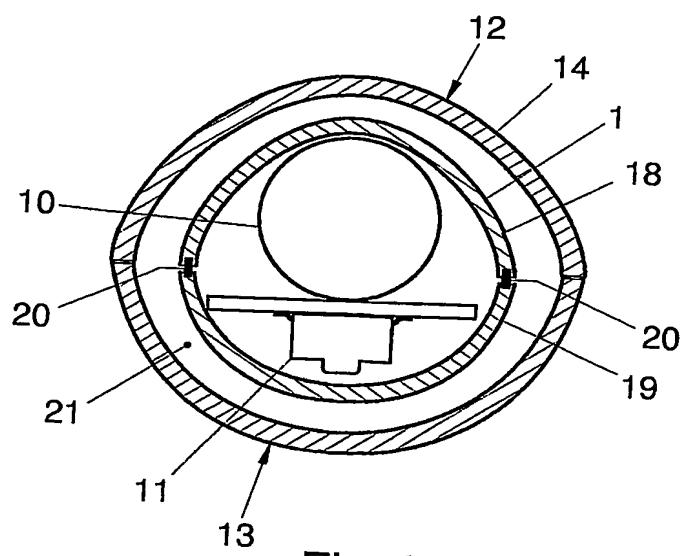
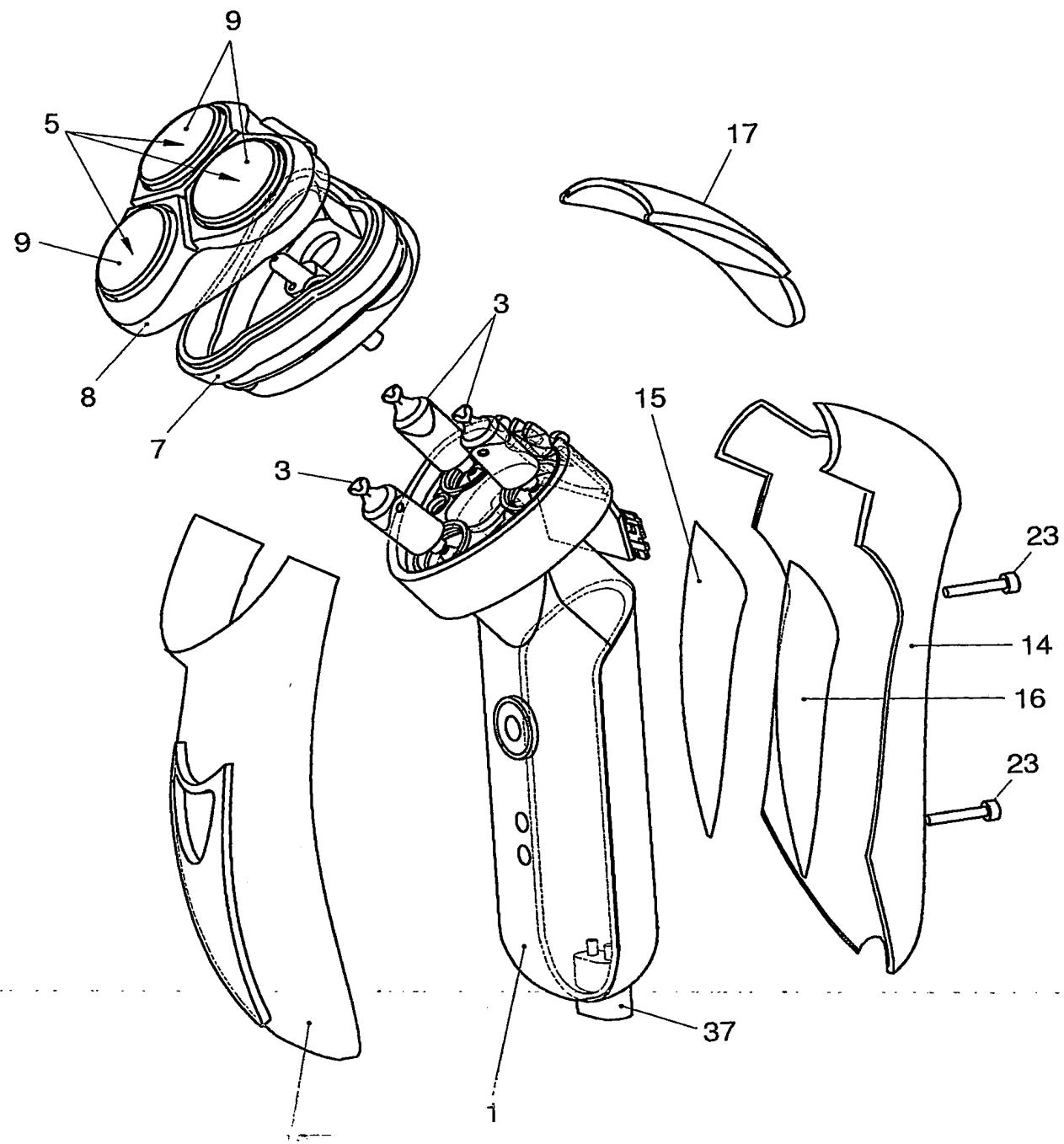


Fig. 3



3/3

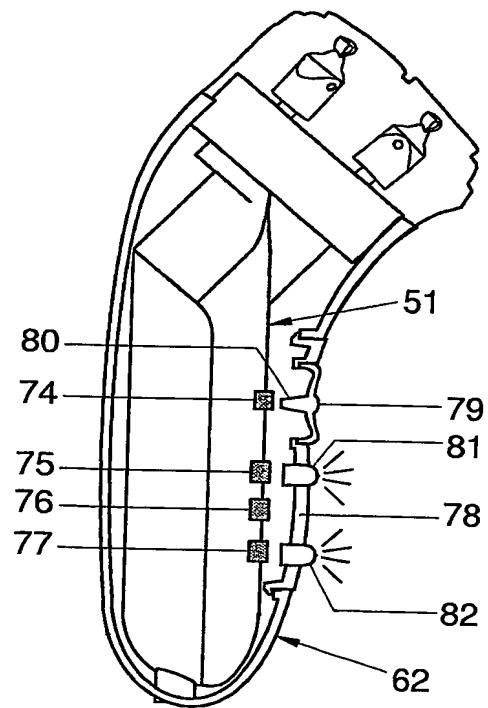


Fig. 5

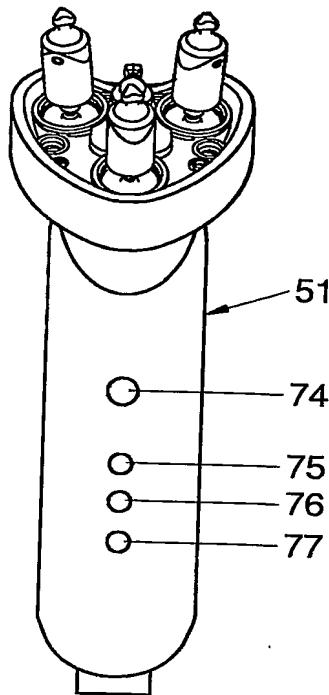


Fig. 6

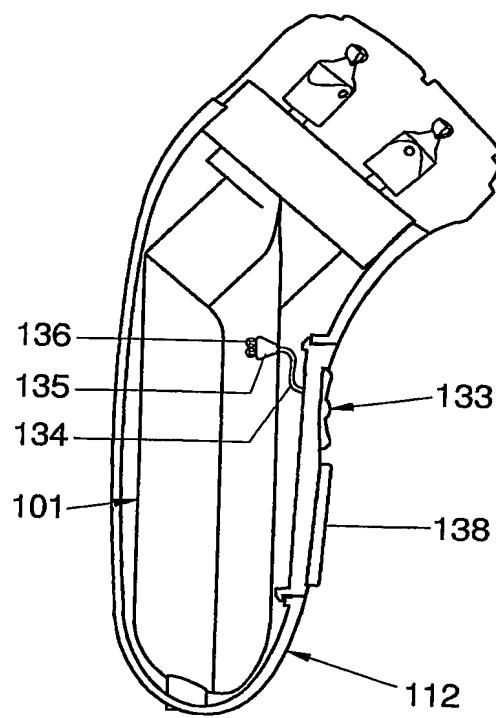


Fig. 7

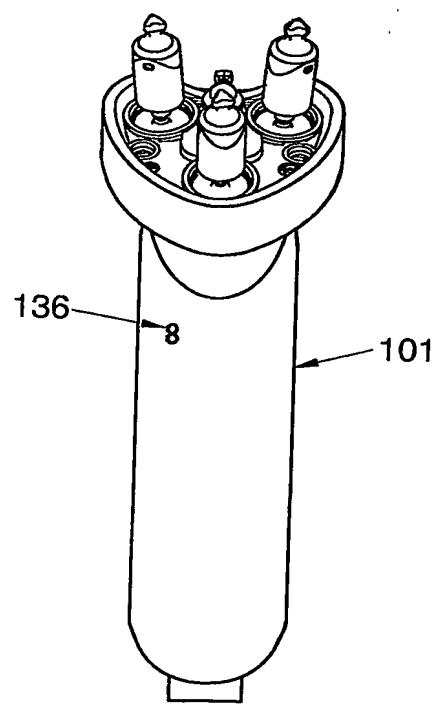


Fig. 8

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